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The majority of these symmetrical figures do not possess the sharp outline of crystals, whilst others can doubtless be referred to the mineral salts held in solution in the composition of the feather. There are both rounded and sharply defined figures,—a fact which any one can verify by the microscope. If I am not mistaken, the crystalline forms are derived from the nucleated cells, and the rounded figures from the granular matter.

Of the conditions necessary to produce these forms I know absolutely nothing. I have never yet succeeded in obtaining them from feathers which had long been removed from the *living bird.* This, however, proves nothing as I have frequently failed to procure any from freshly dropped or plucked feathers, which yield them most readily. Of different cuttings from the same feather made during the same minute, and apparently subjected to the same treatment, some presented figures whilst others did not.

BULLOCK'S ORIOLE.

BY ELLIOTT COUES.

Although the beautiful bird referred to in the works cited[*] has been known by name for nearly half a century, no complete biography has yet appeared; and doubtless many readers of the Naturalist will be glad to have such information as we can furnish from our study of its habits. We will premise that it is a near relative of the Baltimore oriole, or fire-bird, or hangnest, as it is indifferently called; a bird whose striking colors and brilliant vocal powers, together with its abundance in our streets and orchards, have made it a well-known favorite. Like the Baltimore, it is chiefly black and orange in color, but it differs in having a large white patch on the wings, and the sides of the head and neck orange instead of black. The female, as in all the orioles, is smaller than the male and with hardly a trace of his brilliant hues, being plain olive-grey above and whitish beneath with pale yellow on the head, breast and some other parts. The young male at first resembles the female. This is only one of countless cases in which the sexes bear such relations in color. The mother-bird, almost defenceless amidst many dangers, and wholly incapable of protecting her young, is shielded by her humble garb, matching the foliage in which she lives, that she may pass to and from her nest unobserved, and accomplish her important maternal offices in safety. We may judge how well this beneficent design is accomplished, by a glance at any of our large collections where this species is represented; for a dozen or more of the richly attired males will be found for one of the female.

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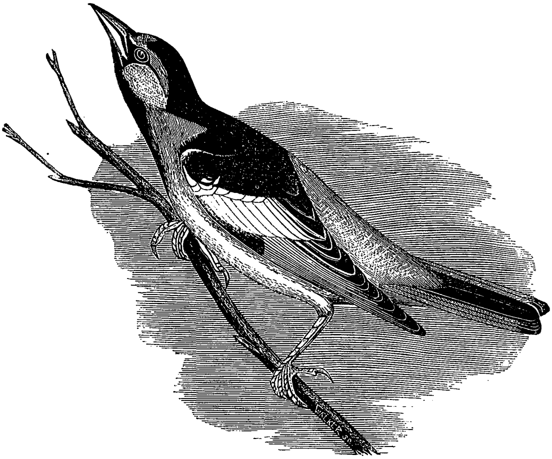
[*] *Xanthorthus Bullockii* Swainson, Phil. Mag. i, 1827, p. 436.—Audubon, Orn. Biog. v, 1839, p. 9, pls. 388, 433, and 8vo, ed. iv, 1842, p. 43, pl. 218.—Pacific Railroad Reports, vi, 1857, p. 87; ix, 1858, p. 519; x, 1859, p. 52; xii, 1859, p. 209, and Mex. Bound. Survey, ii, pt. 2, 1859, p. 20.—Coues, Proc. Acad. Nat. Sci., Philada., 1866, p. 55.—Cooper, Cal. Birds, i, p. 273.—*Psarocolius auricollis* of Maximilian.

Fig. 120.



Bullock's Oriole.

Of the many beautiful orioles that inhabit Tropical America, only two—the Baltimore and the orchard—range northward through the Eastern United States. In the west, several kinds reach our southern borders, but Bullock's is the only one that proceeds further north. Its distribution in the west corresponds, in a general way, with that of the Baltimore in the east. It inhabits all the wooded portions of the Rocky Mountain and Pacific regions of the United States; in most of its range it is separated from the *habitat* of the Baltimore by the intervening treeless Central Plateau, though the two species approach closely, if indeed they may not be found together, along the Upper Missouri. We have no record of its reaching into British America, but should not be surprised to learn that it extends its range beyond the United States in summer. Being strictly a migratory species, like all of its family, it passes south in the fall, to winter in the warmer parts of America. It appears in Lower California in March, but does not complete its migration into the United States until some time in the following month, when the forests it loves to dwell in are clothed with verdure. In the pine clad mountains of Arizona and New Mexico, we never saw it until about the middle of April; then, and until the cool weather of September, we were almost daily gratified with the sight of the gaily-hued birds gleaming through the sombre foliage like tiny meteors, and with the sound of their musical voices awakening echoes along the deepening aisles of the woodland.

In the countries just mentioned, the belts of thick cotton-wood and willows that generally fringe the streams are favorite resorts, perhaps because the pliant twigs are best suited to their wants in constructing their nest. All the orioles are wonderful architects, weaving pensile nests of soft pliable fibrous substances with a nicety and beauty of finish that human art would vainly attempt to rival. These elegant fabrics are hung at the end of slender twigs, out of reach of ordinary enemies; and though they may swing with every breath of wind, this is but cradle-rocking for the callow young, and it is a rude blast indeed that endangers the safety of their leafy home.

Little time passes after their arrival before the modestly-attired females, rambling silently through the verdure, are singled out and attended each by her impetuous consort, who sings his choicest songs, and displays the prowess she admires most. His song is an elegant paraphrase of the Baltimore's, with all its richness and variety, though an ear well skilled in distinguishing birds' notes can readily detect a difference. Their courtship happily settled, the pair may be seen fluttering through the thicket they have chosen, in eager search for a building-place; and when a suitable one is found, no time is lost in beginning to weave their future home. It is a great mistake to suppose that birds of the same species always build in the same way. Though their nests have a general resemblance in style of architecture, they differ greatly according to their situation, to the time the birds have before the nest must be used for the reception of the eggs, and often, we are tempted to think, according to the taste and skill of the builders. In their work of this sort, birds show a remarkable power of selection, as well as of adapting themselves to circumstances; in proof of which we have only to examine the three beautiful specimens now lying before us. Each is differently constructed; and while all three evince wonderful powers of weaving, one of them in particular is astonishingly ingenious, displaying the united accomplishments of weaving and basket making. Before proceeding, we may premise that the idea of the nest is a sort of bag or purse, closely woven of slender pliant substances like strips of fibrous bark, grasses, hair, twine, etc., open at the top, and hung by its rim in the fork of a twig or at the very end of a floating spray.

The first nest was built in a pine tree; and if the reader will call to mind the stiff nature of the terminal branchlets, each bearing a thick bunch of long straight needle-like leaves, he will see that the birds must have been put to their wits' end, though very likely he will not be able to guess how they made shift with such unpromising materials. They made up their minds to use the leaves themselves in the nest, and with this idea they commenced by bending down a dozen or twenty of the stiff slender filaments, and tying their ends together at the bottom. If you have ever seen a basket maker at work, with his upright pieces already in place, but not yet fixed together with the circular ones, you will understand exactly what the birds had thus accomplished. They had a secure framework of nearly parallel and upright leaves naturally attached to the bough above, and tied together below by the bird's art. This skeleton of the nest was about nine inches long, and four across the top, running to a point below; and the subsequent weaving of the nest upon this basis was an easy matter to the birds, though, if one were to examine a piece of the fabric cut away from the nest, he could hardly believe that the thin yet tough and strong felting had not been made by some shoddy contractor for the supply of army clothing. Yet it was all designed in a bird's little brain, and executed with skilful bill and feet.

Perhaps the young birds that were raised in the second nest did not appreciate their romantic surroundings, but their parents were evidently a sentimental pair. If they did not do their courting "under the mistletoe," at any rate they built a cozy home there, tinting the sober reality of married life with the rosy hue of their earlier dreams. The nest was hung in a bunch of the *Arceuthobium oxycedri*, an abundant epiphytic plant that on the western wilds represents the mistletoe, and recalls the cherished memories of holiday gatherings. The nest was a cylindrical purse some six inches deep and four broad, hanging to several sprays of the mistletoe, which were partly interwoven with the nest to form a graceful drapery. The felting material was long, soft, vegetable fibre of a glistening silvery lustre, in artistic contrast with the dark-hued foliage. A few hairs were sewn through and through, for greater security, and the pretty fabric was lined with a matting of the softest possible plant-down, like that of a buttonwood or an Asclepias.

The general shape and the material of the third nest were much the same as those of the last; it was, however, suspended from the forked twig of an oak, and draped almost to concealment with leaves. But it had a remarkable peculiarity, being arched over and roofed in at the top with a dome of the same material as the rest, and had a little round hole in one side just large enough to let the birds pass in. Such a globular nest as this is probably exceptional; but now it will not do to say that orioles always build pensile pouches open at the top.

The eggs of this species are four or five in number, and rather elongated in form, being much pointed at the smaller end. They measure on an average just an inch in length, by about two-thirds as much in greatest diameter, which is much nearer the larger than the smaller end. In color they are very pale bluish, or rather whitish with a faint dull blue shade, and are everywhere irregularly overrun with fine sharp hair lines of blackish brown, or blackish with a slight tinge of purplish. These curious zigzig markings are characteristic of the eggs of a majority of the birds of the family (*Icteridœ*). They have no definite style, but wander at random over the surface, and in no two specimens are they alike. Thus in one specimen the lines, fine as hairs, are wound round and round the butt, with such regularity that they hardly ever interfere; in others, they are snarled up in different places; and sometimes, particularly at a sharp turning-point, the lines spread into little spots; and there are often a few such isolated markings in various places over the egg.*

We need say nothing of the general habits and manners of Bullock's Oriole, for it does not differ from the well-known Baltimore bird in these respects.

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*The nests and eggs above described were collected in California and are now in the Smithsonian Institution, where we have been generously allowed to examine them.